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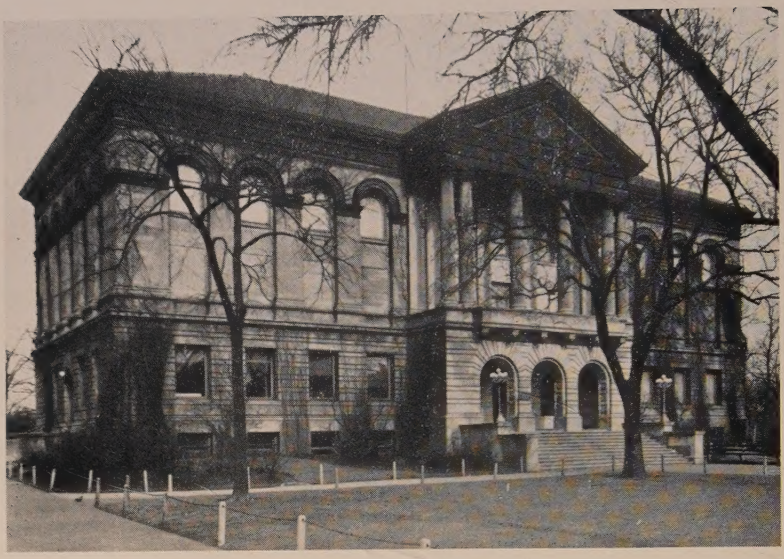

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View of the south end of Sheep Mountain, White River Badlands, South Dakota. The spires and pinnacles are eroded out of the hardened clays and sandstones which contain some of the richest fossil vertebrate faunas known.

Collecting Fossil Vertebrates

Bryan Patterson

The old prospectors' saying that "gold is where you find it" has, with much repetition, become almost trite, although in its original application it has lost none of its force. It is particularly true of vertebrate fossils. The collector of these may have to dive into the clear waters of a Florida spring to gather them from the sands at the bottom; he may have to sieve ant hills for minute teeth; he may have to descend into coal mines and pick his specimens out of the roofs of the underground galleries, which are sometimes abandoned and dangerous; or he may even follow a hydraulic crew in the placer deposits of Alaska and thus recover specimens that have reposed for thousands of years beneath hundreds of feet of frozen muck and gravel. In one noteworthy instance, in which fossil-bearing concretions were exposed far out of reach in a high cliff, collectors have shot the concretions out of their bed with rifles. These cases which prove the general rule are nevertheless exceptional. The great majority of fossil vertebrates are found in arid or semi-arid regions of the world where fossil-bearing geologic formations are widely exposed. Typical of such areas is the great White River Badlands in South Dakota (Frontispiece), the classic collecting ground in North America for fossil vertebrates of Oligocene age. It is in regions like this that the fossil hunter does most of his field work and any account of fossil collecting, an occupation to which a certain aura of romance still clings in this day and age, may most advantageously be woven about his daily round in such surroundings.

Before proceeding to this the ground may be cleared by answering at the start the familiar question "How do you know where to look?" The reply of course is that, as in all other human occupations, the necessary knowledge has been gained by cumulative experience, each generation standing on the shoulders of its predecessor. The first men to work in any part of the world do not know if their efforts are going to be rewarded. The first paleontological explorers of the American West had no knowledge of the fossil treasures buried there; they looked for themselves, tracked down the "leads" provided by trappers and traders who claimed to have seen big bones in such-and-such a spot, and were rewarded beyond all expectation. Those who came after them provided their quota of information, until today it is difficult to find a part of the United States in which fossil-bearing formations occur that has not been prospected by "bone diggers," the term by which collectors are usually known to the residents of the regions in which they work. Thus if a museum needs, let us say, early Eocene

mammals from North America for its exhibition and research collections its staff has an adequate idea as to where to send an expedition to obtain such specimens. On the other hand, were the same institution to desire early Eocene mammals from Asia, Africa or Australia, continents in which no mammal-bearing deposits of this age are known, it would have to undertake exploration with no guarantee that this specific objective would be fulfilled.

Fig. 1. Part of the vertebral column of the great herbivorous dinosaur *Apatosaurus,* as uncovered in an excavation in the upper Jurassis beds a few miles west of Grand Junction, Colorado. Some of the bones have been encased on one side by plaster jackets.

With this preliminary over we may proceed to the description of collecting. Camp will more often than not be pitched in a most unprepossessing spot, a bare sun-drenched space frequently with no more shelter available than that provided by a few bushes or a stunted tree. Equipment of a prosaic sort will be scattered around: tents for living quarters and storage of equipment, a truck or an old automobile with plenty of clearance, picks and shovels, hammers and chisels, knapsacks and canteens, shellac and alcohol, plaster of Paris and burlap.

The day's work is long and hard. After breakfast each man burdens himself with his knapsack filled with tools, lunch, field book and wrapping paper, his canteen and his prospecting pick, and starts out to prospect until evening. His two essential qualifications are optimistic

perseverance and the ability to recognize at sight fragments of fossil bone however small. He walks up, down and along the rock exposures keeping his eye peeled for such fragments. In the course of the day he may come across many of these weathered out and lying in flats or on slopes, several of them often grouped together. All will be examined to see if any are of sufficient interest to be worth collecting, or if any will fit together to form a complete bone or part of a bone. A search is always made in the vicinity of a group of fragments to see if the place from which they are weathering can be found. The collector follows the scraps up the slope, locating a piece here and a piece there, always hoping to see the weathered end of a bone protruding from the bank. Nine times out of ten he is disappointed and has to continue on his way, solacing himself perhaps with a few interesting surface fragments that he has picked up. These he carefully wraps in a package, writes a number on the outside and enters the number together with the necessary data in his field note-book.

This wearisome round of anticipation followed by disappointment may go on for days or even for weeks if the formation is a sparingly fossiliferous one. Sooner or later, however, the collector makes his strike. He finds a goodly pile of surface pieces, many of which fit together, and quickly discovers the spot where more bones are weathering out. This done, every visible fragment is recovered and the loose dirt is scratched up and sieved to discover any that might have been buried in the wash. Not until this task is finished does the work of excavation commence. A few strokes with the prospecting pick into the bank just above the exposed bones, followed by a few minutes work with the awl and brush soon show whether the "prospect" is going to prove worthwhile or not. This is the really exciting part of the game. To uncover a bone inch by inch, come to its end and then find another continuing into the bank provides a thrill to which even the most experienced never become hardened. If the fossil is an unfamiliar one the collector's cup is full; he forgets the heat, the gnats, his thirst and general discomfort, and exists only for the next revelation to be laid bare by his awl or chisel. At about this stage he is forced to temper his curiosity with patience, for fossils, despite their great age, are fragile things, and a careless tool stroke may cause irreparable damage. Bones lying near the face of the bank are usually badly cracked by weathering, especially if the surrounding matrix is a clay rock, and may even be somewhat displaced by frost action. If they are well preserved, the breaks in them clean, and the pieces not too small, each bone may be taken up section by section and wrapped. If they are crumbly and broken into many small fragments a thin solution of shellac in alcohol is poured over them. This, when dried, holds rock and bone together. After the fragile part of his specimen has been

attended to, the collector sets about uncovering the rest. He carefully and patiently removes the rock over each bone that he encounters, forming and discarding as he does so numerous speculations as to how the animal was lying when buried, and hopes against hope that the skull and jaws will be present. If they are, the interest and importance of the find are greatly enhanced. After the last bone has been uncovered and the excavation continued for some distance beyond, in order to make reasonably sure that nothing has been missed, the collector sees his discovery revealed in its entirety and experiences a sense of satisfaction that is not to be expressed in words.

He cannot afford to spend much time inwardly hugging himself for the most difficult part of the task is still ahead. It is one thing to uncover a fossil, and another to remove it properly from its bed. Any mistakes made will bring down on the collector's head the instant wrath of the preparator who will prepare the specimen in the museum and who may be put to endless trouble by acts of carelessness at this stage. It is, in fact, necessary to keep this possibly irascible gentleman in mind at all times since the maximum of care used in collecting results in the minimum of time spent in preparation. We may suppose, for the purpose of this account, that the fossil lying before its discoverer is that of a medium-sized animal, about the size of a goat, and, furthermore, that it is that great rarity, a fairly complete skeleton. The bones will be somewhat scattered, a group here and a group there, with isolated ones lying between and around. The collector determines which bones may be taken out in pieces and wrapped and which must be taken out in groups. After the single bones are removed, the groups are blocked out by removing the matrix around them so that they stand up on pedestals. The bone surfaces are then covered with paper which is applied with a wet brush. Burlap is then cut into strips of the proper length and width, and a thin mixture of plaster of Paris and water is made in a pan. The burlap strips are dipped in this and put over the top of the blocks, care being taken to see that they fit closely to the surface. When the plaster sets, a firm jacket or cast is formed for one side of the bones and their surrounding matrix. If the blocks are small they may be loosened by inserting a tool beneath them and then turned over, but with large ones the turning operation must be performed more carefully lest everything fall out of the jacket to the grievous damage of the specimen. In such cases undercutting is resorted to, the overhanging edges being secured by burlap strips anchored to the jacket, until the pedestal is small enough to permit turning without risk. Once turned, the excess matrix is removed from the bottom and the jacket completed. This process, developed by the great American collector John Bell Hatcher, protects the specimen from possible damage during shipment and in storage, and has the

great advantage of keeping badly broken bones together, thus greatly facilitating the work of the preparator in the laboratory.

The blocks safely back in camp and properly numbered, the collector sets out again to repeat the performance as often as he can. The job just described may have lasted from one to several days, depending upon the hardness of the rock, the state of preservation of the

Fig. 2. "Carnegie Hill" near Agate, Nebraska, a famous quarry locality for fossil mammals of early Miocene age. The excavations are visible at the left side of the hill.

specimen and the amount of rock, the overburden, above it. Small specimens may sometimes be taken out in an hour or less; large mammal skeletons often require weeks of work by several persons, while the excavation of a skeleton of a large dinosaur may last for an entire field season (Fig. 1). Rather frequently bones are found congregated in layers and pockets, or "quarries," to give the name used in professional circles, which are sometimes very extensive. One such occurrence, near Agate in northwestern Nebraska (Fig. 2), has been worked on and off since 1904 and still shows no signs of petering out, although work there becomes progressively more difficult due to the fact that as successive parties dig farther and farther back into the hill each leaves a deeper overburden for the next comers to remove. In some quarries a varied fauna is found, in others only a few kinds of animals occur, and in exceptional cases only one. Quarries are of considerable importance scientifically since they often reveal a cross-section of the animal life that lived in one place at one time, and since they usually yield good series of specimens of most of the species

present. Comparable data are not always given by isolated finds from scattered localities occurring at various levels in a given thickness of rock strata. Work in a quarry lends itself to routine; the party arrives, knocks off for lunch, and leaves more or less on time. Moreover, the thrill of individual discovery is largely absent, so that all in all, athough the results are surer, quarrying is not quite as attractive as prospecting.

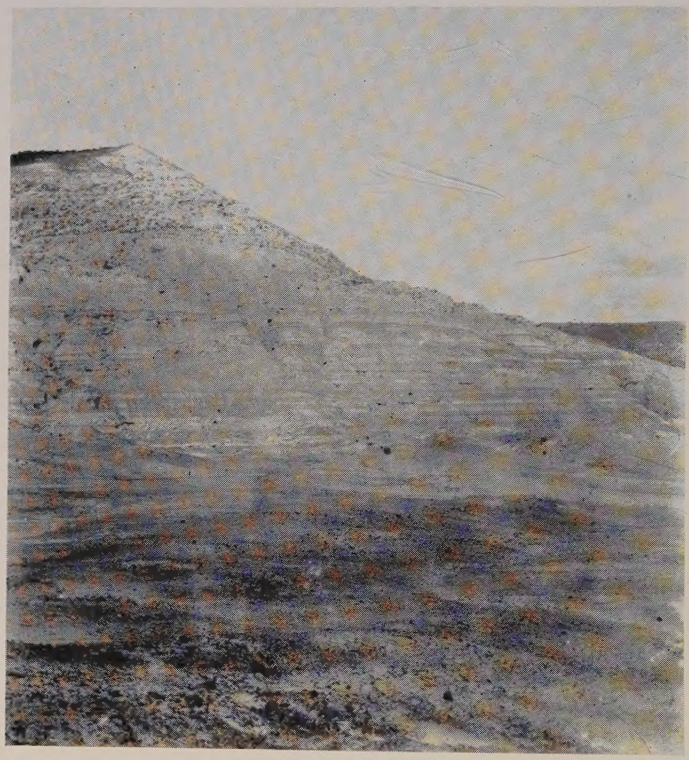


Fig. 3. A hill composed of late Paleocene and early Eocene clays and sandstones in Plateau Valley, Mesa County, Colorado.

The actual collecting of the fossils is a most important part of any expedition's activities, but it is nevertheless only a part. A specimen of a living animal has little scientific value unless accompanied by good data as to locality, elevation, etc. A fossil without information as to locality and geologic horizon has equally little meaning. For this reason part of the collector's time is devoted to making careful studies of the succession of the rock strata in which he finds his specimens, and

to indicating on these sections the level of each fossil he finds. Fig. 3 shows a hill about 1200 feet high in Plateau Valley, Mesa County, Colorado. Accompanying it is a drawing compiled from field records showing the kinds of rock of which it is composed and the field numbers of specimens found at various levels on its slope. Such records were particularly essential in this case because the fossils from the top of the hill belonged to well known genera characteristic of the early

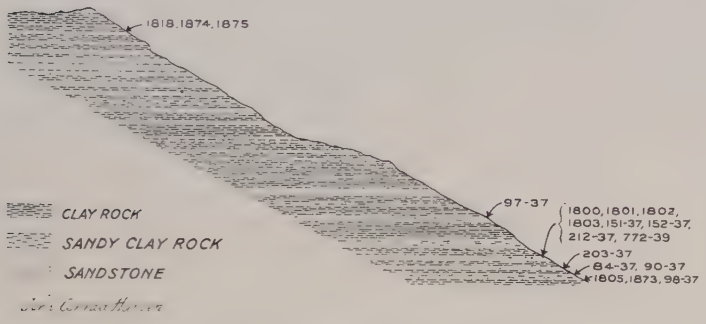


Fig. 4. A section of the rock strata in the hill (Fig. 3), showing the levels at which fossils were found. The numbers are those given in the field to specimens collected at this locality during several seasons work.

part of the Eocene epoch, whereas those from the bottom were deposited in the later part of the earlier Paleocene epoch. Had no records been kept it might have been impossible to determine the age of some of the new and striking forms discovered at this locality. Accurate field records, combined with close study in the museum, provide conclusive evidence of evolution, and for groups such as the horses that are abundantly represented in the fossil record, complete genealogies can be built up in which almost every developmental step can be traced.

At convenient times during the season shipments of the fossils collected are made to the museum. It is almost always necessary to make special boxes for this purpose; often these have to be "tailored to fit" certain of the larger blocks. The plastered pieces and packages are carefully packed in hay or straw to guard against jolting in transit.

The last shipment made and the camp equipment packed, the party returns to the museum there to begin the long but equally interesting task of preparation and study of the collection made. The time spent in collecting a specimen is often equal to but a small fraction of that spent on it in the laboratory before it reaches its resting place in the exhibition or research collections.

Thus are fossils collected and such are the experiences of those who hunt them. It is a delightful existence providing hard but fascinating work, pleasant companionships, and hearty appetites. The petty cares and worries of city life fade into insignificance; wars and rumors of wars lose much of their horror and seem remote and unreal. A most pleasant feature is that one is always eager to go and yet always glad to return home when the work is done. One returns, moreover, with renewed vigor and ambition, for paleontologists, like Antaeus, gain strength from contact with Mother Earth.

—*Field Museum of Natural History.*

Microscopy for the Amateur

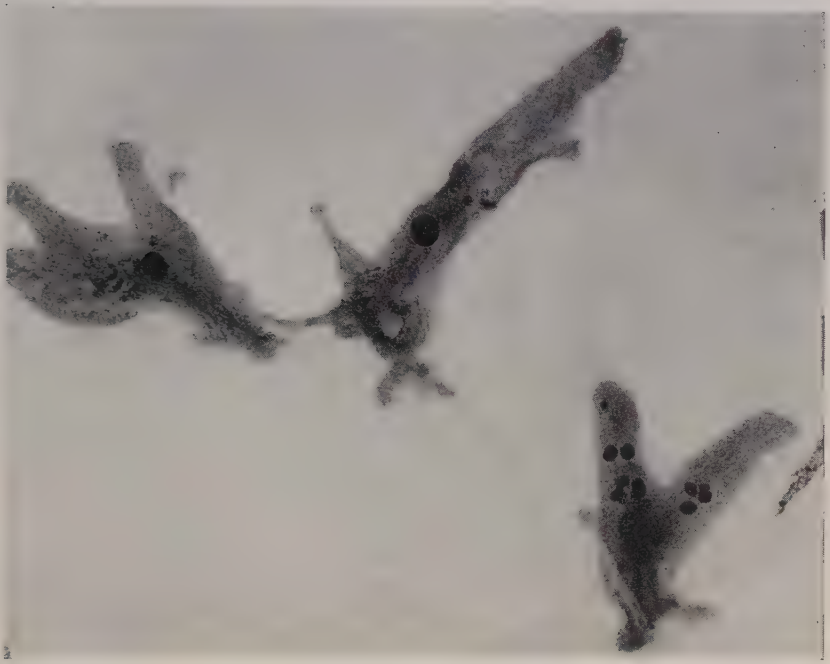
Jens E. Nielsen

The innumerable interesting objects that may be observed under a microscope have caused a large number of people to choose microscopy as their favorite pastime. The only prerequisite for this fascinating scientific hobby is an open mind, an eagerness to discover new truth and thus help lift the veil which still covers a multitude of mysteries. Leeuwenhoek, Pasteur, and Koch were only amateurs with the microscope but their pioneering work has brought great benefit to mankind.

A microscope does not necessarily need to be very expensive. In selecting an instrument, however, one should give preference to a stand to which lenses can later be added as one's pocket-book permits and as the need is felt. Through the microscope an entirely new world is unfolded—new because nothing like it may be observed with the naked eye; each little piece dovetails into another, like a jigsaw puzzle, to form a complete picture of the world as we see it, sense it, and understand it, in spite of the fact that ten new questions may be raised to each answer found.

Observation through the microscope of primitive life in an alga; of a complete life cycle in an ameba; of the minute world of microscopic life in a drop of water; of a crystal of salt; or a mere hair on a fly's leg—each is an unforgettable experience making one feel the superi-

ority of modern man in being able to produce such remarkable tools, and giving him the urge to seek deeper and deeper into the many riddles before him.



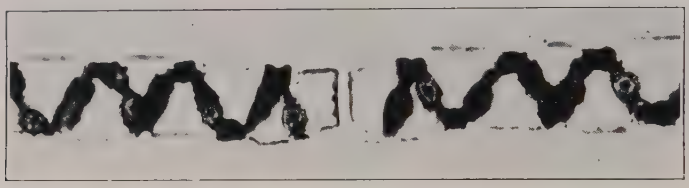
Courtesy, General Biological Supply House, Inc., Chicago.

Typical specimens of *Amoeba proteus* photographed from a prepared slide. Note nuclei, food vacuoles and, in the middle individual, a contractile vacuole.

Let us make a short excursion into a drop of water and observe what is taking place. We shall not use mere tap or lake water, but on an afternoon stroll into the woods and fields we shall seek out a good-sized ditch with stagnant water, or an old swimming hole with yellow or greenish scum. It may look disgusting at first, but it is the kind which is teeming with life, the kind that makes the miscroscopist sit up nights and forget trivialities which have annoyed him during the day. We fill a small bottle with scum and another bottle with some of the bottom ooze and head for home. Arriving at our peaceful sanctuary we place a drop of our find on a glass slide, put a cover glass over it, and when the drop has spread out in an even layer between the two pieces of glass, it is ready for examination under the microscope. We place the slide on the stage and arrange the light so that a beam is

thrown up from the mirror below, through the slide and into the objective. Next the objective is focused on the drop of water and here we are!

Well, what do we see? We may see black spots of dirt from our lenses, we may see air-bubbles which look fascinating at first, but soon become uninteresting, or we may see nothing at all if we have the wrong kind of material or if we have been over-generous and put too much of it on the slide. However, if we have selected our material carefully and prepared the slide well, we shall be gazing into a completely new world.



Courtesy, General Biological Supply House, Inc., Chicago.

Two vegetative cells of the alga *Spirogyra*, showing the spiral chromatophores.

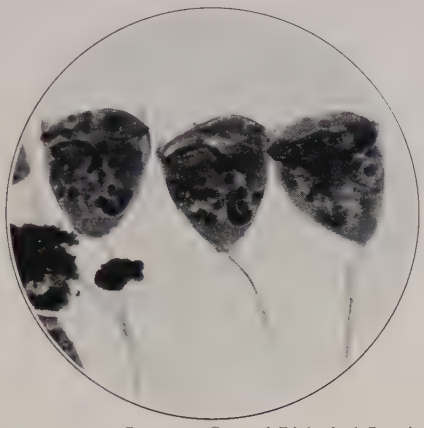
Among the algae may be the beautiful green *Spirogyra*, divided into cells having spiral bands of green chlorophyll; or the light may strike the pearly beads of *Anabaena*, and in between may be the light hairs of *Oedogonium*, the spores of which move about freely. In and out of this

Courtesy, General Biological Supply House, Inc., Chicago.

A common diatom ("glass boat"), *Pinnularia nobilis*.

fairyland-forest is life teeming with the queerest creatures imaginable. Our attention is drawn to a slowly moving "glass-boat" just coming into view—it is a member of the diatom family which includes a great variety of beautiful forms. Suddenly we are surprised by the arrival of a slipper-shaped "beast," a paramecium, whose body is covered with fine "hairs" called cilia, which by continuous motion serve to propel their owner. We note an opening at one side into which is passing a steady stream of water; this is the mouth, and the food entering it consists mainly of bacteria of which stagnant water is always full. This one-celled microscopical "guinea pig" is a busy fellow who has no time

to linger and is soon out of sight. As we look around we note something which looks like a small cluster of flowers; it is the bell-animal *Vorticella.* The stem is rather strange in that when stimulated it will suddenly contract like a corkscrew and then slowly straighten itself out again. We have here the first semblance of muscle action as in



Courtesy, General Biological Supply House, Inc., Chicago.

The "bell animal," *Vorticella.* The beating of cilia at the rim of the bell carries food into the cell.

higher animals. The bell itself is the "business end" of this creature, and around its rim are cilia which are constantly churning the water, carrying smaller organisms into the bell in order to satisfy a voracious appetite.

A small water-flea crosses the field—it goes so fast that we do not have time to verify that it is a half-cousin to the lobster! But say, a long green submarine is now coming into view; at its front end it has a long one-haired beard with which it propels itself, and a red "eye-spot" with a lean and hungry look; it is *Euglena,* the organism which the zoologists claim is a plant and the botanists say is an animal. Here is really an orphan of the storm for which some microscopist could do much in the way of adoption. Part of its food is manufactured from the sunlight which forms starch from water and carbon dioxide when it strikes green chlorophyll; the balance of its diet, again bacteria, is hunted up in the fairyland wilderness. After watching the trumpet-shaped *Stentor* and a few of the many wheel-animals (rotifers) we may find that our eyes need a rest, and in order not to overdo a good thing we call it a day, put away the scope, and begin to plan the next excursion.

Four Downy Cubs *

Tappan Gregory

The mother fox knew that there had been woodcutting on the woodlot and that some of those choice sites where the young had been reared the preceding year were no longer sheltered and hidden. Exposure to view made them risky. But there was still that fine, deep ditch, made by erosion, with its intricate system of sheltered draws. And so she prowled around, exploring some of the old favorite spots, investigating woodchuck holes and finally reaching a decision. Prudence dictated the abandonment of the old homestead and the establishment of a new home where this could be done without too much in the way of reconstruction.

Four baby foxes . . .

Red foxes are highly intelligent. They are wise and keen and they exercise every precaution that their habitation may not be discovered by man. And they will brook no interference. It takes very little human disturbance to inspire them to move the little ones, even though this involves new diggings, accomplished at the expense of hard labor.

*Photographs by the author and R. S. Sturgis; reprinted by permission of Thomas Y. Crowell Co.

Our inspection of the woodlot disclosed no sign of activity at the dens that had been so full of life the year before. And then came rain, reaching almost to cloudburst proportions, and the consequent floods. I do not know whether this or other influences impelled the foxes to move. Two weeks later favorable sign in the ditch was lacking where it had been quite convincing a few days earlier. And there was again definite activity in the woodlot.

Mice were plentiful and the vixen had brought in many a little carcass to use in the schooling of her young. We found them scattered in the neighborhood of numerous dens among the trees about which lay chicken feathers, bits of rabbit fur and portions of woodchuck carcass.

It was not unnatural, perhaps, that our first camera should be placed on a tree, trained on the burrow where a two-thirds grown cub had pressed the wire the year before. Near the top of the mound of sand,

. . . and where they played.

we found a depression suggesting that here the cubs were wont to play, and close by, at the foot of a tree, a mouse carcass in the middle of a smooth, clear spot, gave mute testimony of further activity.

But the weather was still unsettled; that night it rained quite steadily and in the early morning the fall continued. Our wire had been stretched across the top of the mound only a few feet from the

mouth of the den and something had struck it since our last visit, for the flash had been discharged and a picture taken. Close to the two copper bands that constituted our trip, too near the camera to be in focus, we found evidence that a gray squirrel, undoubtedly after daylight that morning, had skipped over the wire. No other sign was visible. The closest scrutiny disclosed not the slightest imprint from the paws of those light-footed youngsters residing in the burrow. We were not to know of our luck until several nights later, in the home darkroom, when the first glimpse of the negative against the red light turned up these four cubs, posing themselves more perfectly than could ever be induced by human agency.

Your Lake

Verne O. Graham

Nestling among the red pines and black oaks of west-central Michigan lies a circular lake, visited yearly by nearly a thousand boy scouts, and perhaps familiar to more people than any of the tens of thousands of similar lakes throughout the area of the glacial drift.

Across this lake toward the west in late afternoon golden tints from the sinking sun color the sky and the forest and the surface of the water, and with them comes a tranquillity uninterrupted except for the occasional splash of a fish, the song of a harvest fly, or the cheerful call of a song sparrow. During the early morning, when shades of blue predominate in the sky and water, a lonely heron may laboriously tread the air and cry out as if to lament some tragedy of which we can but guess. Summer evenings and summer mornings colored and flavored by such conditions have been many; for a thousand years, yes, for many thousands of years, such crystal-clear lakes, fringed by the forest, have been the setting for the play of delightful colors and for the annual pilgrimages of feathered life.

Crystal Lake is bordered by white pine, red pine, and black oak on a rise of the shore from twenty to fifty feet above the water. The slanting rays of the sun strike the north shore and hillside more or less directly; their heating and drying effect is here much greater than elsewhere. By contrast the heat rays shine over the shore elevation along the south side of the lake at an angle so low that much of the heating and drying power is lost. The contrast of the two shores is intensified by the shade of the trees on the high marginal hills.

Toward the northern side, Crystal Lake is very deep. Plant life is present in the water but is made up of widely separated forms, and consequently the accumulation of deposition is relatively small. The south side of the lake is shallow; much plant life forming almost solid associations is the rule and the accumulation is great. Here the evidence indicates that such deposition has occurred for many years. The

Crystal Lake, almost circular in outline, is fringed with oaks and pines on the high banks. Chicago Boy Scouts for many years have camped at this lake.

lake bottom is of soft humus and mud, overlaid by shallow water through which emerge bulrushes and cat-tails. Here boating and swimming are conducted with difficulty.

The north shore is constantly dry, sometimes almost desert-like, with little plant and animal life and but little deposition in the water. The lake here therefore is very slowly changed, if at all. The south shore is moist and shaded, with much plant and animal life and from this life there is much deposition in the water. Is it any wonder that after several thousand years the two sides of the lake have come to differ greatly? Were this description true of this lake and of no other it would be of small value, but add the story of ten thousand other lakes affected by the same conditions and a basis for an understanding of all of them is established.

The story of Crystal Lake, covering more than twenty thousand years, is the story that might be told of many others, with minor modifications due to the position of outlet or the irregularity of outline containing bays, peninsulas or large lobes in the shore contour. This is the story of how a great and powerful heavenly body, the sun, forces heat and light upon the earth, of how the powerful energy radiating in straight lines is far greater when received perpendicularly than otherwise, of how the south-facing slope on the north side of the lake is not only without shade but in addition receives the maximum light and heat, of how the north-facing slope is not only shaded by the fringing forest but receives what sunlight comes to it at an angle. The south face is usually of low moisture content; the north face is always moist, contains vegetation much of which approaches a climax association, but the pioneer stages are much in evidence on the opposite shore. Add to all this the multiplicity of animal life present where the vegetative growth is dense, and the total picture takes form.

No doubt the reader already has formulated the question: Is it correct to speak of south and north when in reality the sun's heat is greatest one or two hours after the noon hour, when the sun is 15 to 30 degrees west of a true south? The evidence shows the center of greatest deposition and of greatest plant growth in the lake to be somewhat to the west of south, and the reverse condition somewhat to the east of north on the other side of the lake.

During cloudy, misty or rainy weather one lost in the north woods may look for some way to determine directions. He may search for the green growth of *Pleurococcus* on the north sides of trees only to discover that the forest has produced a shade so uniform that such greenness is on all sides of the trunks. He may again be foiled when evidence of greater growth of trees on the south is sought, for again density of the forest prevents differentiation in amount of north and south lighting. The lake, on the other hand, is large enough to permit directional evidence always to be present. An understanding of the development of these lakes may well be of value in other ways. Should you desire to introduce some humor when your friend invites you to visit him in his north woods cottage on Bear Lake, ask him why his lake is so much deeper on the north than on the south side. He will no doubt come back with the counter question: When did you visit my lake?

An understanding of lakes may also lead you to build your cottage on the side where swimming is good and leave the other side unmolested for your enjoyment, for walks among nature's bountiful production. Your cottage will then be placed where vegetation is sparse, the lake bottom is good for wading and swimming and the boat may be

launched for a row without oar-entanglement in hornwort, bladderwort, pondweed and water milfoil. You can sit quietly on the beach during the early morning or late afternoon and listen to the "stake driver" (bittern) as he pumps his head up and down while emitting the peculiar sound similar to the driving of a stake into soft mud, or with field glasses peer across the lake and watch herons, ducks and numerous other birds at their feeding grounds.

More than 25,000 years ago, with the melting of the ice, many depressions resulted in the formation of numerous lakes. Some were deep and round or irregular in shape, others were shallow and subsequently have been reduced to marshes or prairies, but each and every one of them has undergone changes much as described in the preceding paragraphs. Some have been further modified by their outlet, some by lobing of their contour, which created north and south faces at many points with the consequent merging of the deposition into adjoining areas. The story of such lakes involves several factors and is very much more complex than for a circular lake.

Until you have had time to reexamine some of the lakes you visit often, let us hope that the foregoing will arouse some curiosity for pondering and wondering, and especially for anticipation of your next visit.

CATKINS

The pussy willows, silken soft,
Like cautious kittens running,
Are peeping out along the swamp
To charm me with their cunning.

Their pearly gray is like the dawn
That promises a day divine.
This morn has brought me hope again;
Forever more, this day is mine!

Beneath each little fuzzy ball
I find a budding leaf of green;
'Tis Hope, so close a friend of Spring,
Who waves her hand with happy mien.

Wet feet these kittens do not mind,
So still, they are, a-sunning,
With silver coats so downy soft
While Winter's snows are running.

—Lena Mearle Shull.

NOTES FROM THE FIELD

An Interesting Behavior of Yellow Birch in the Great Smoky Mountains*

In the Great Smoky Mountains National Park the yellow birch (*Betula allegheniensis*) has a very interesting habit. Even the most casual observer hiking in the mountains has seen the yellow birch standing up on its roots. Seen through the mists which frequently envelop the mountains they sometimes suggest some giant bug waddling through the forest, sprawling its several legs clumsily over rocks and logs. The explanation of this peculiar appearance does not always suggest itself to persons who look no farther than the trees which they see standing on their stilt-like roots. A closer inspection of the surrounding forest would reveal all ages of trees with more or less of this habit. The younger ones will be seen to send down their roots around logs on which they have germinated. These roots grow into root-trunks, or false-trunks, and several decades later when the log has decayed completely they support the main trunk.

Yellow birch, rhododendron, and dog-hobble seedlings which have germinated on a large burl of a dead tree trunk at a height of about seven feet above the ground.

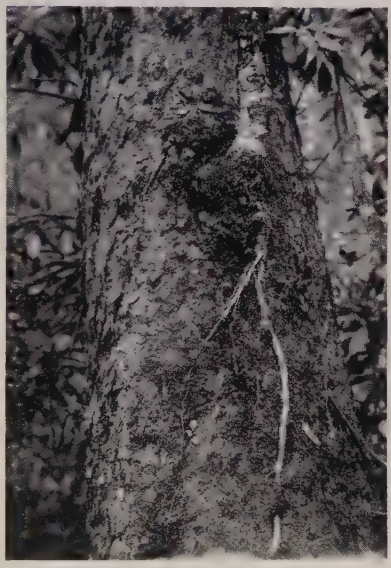
In the Canadian Life Zone in the Great Smoky Mountains, that is, in the spruce and fir forests, mainly above 5,000 feet elevation where yellow birch is a frequent associate of the evergreen trees, and in the rich upper valleys, or coves, where birch is an important tree species mixed with hemlock, buckeye, maples, etc., the yellow birch germinates more abundantly upon logs and moss-covered rocks than it does on the ground. This may be due to the heavy litter on the soil surface which prevents most of the light birch seeds from reaching the inorganic soil where they might germinate. It may be due partly to the fact that the young seedlings that start on the ground have greater competition to face early in life and thus most of them lose out in the struggle for survival, while in the semi-epiphytic situations they can more easily reach a suitable substratum and also enjoy less competition. At any rate, the humid atmosphere of the cove forests and the spruce-fir forests

*Contribution, Botanical Laboratories, The University of Tennessee, N. Ser. 39. All photographs by the author.

Two intertwined yellow birch trees standing on root-trunks, the log on which they germinated having rotted away.

is conducive to the survival of the young birch trees up off the ground, sometimes to a height of several feet above the surface. In more open situations the seedlings, and the substratum on which they live, would become too dry from excessive water loss to the air for abundant survival. But no such problem presents itself to the semi-epiphytic birch plants in the Smokies where it rains so frequently and the atmosphere is so humid it is "smoky." Also, under the heavy canopy of the tree crowns, the local, or microclimate as it is called, it quite equable —one might say, almost oceanic, in comparison with an ordinary continental climate where contrasts between moist and dry and cool and warm are frequent and sudden.

This interesting habit of the yellow birch suggests in a small way the growth form of the Banyan-type of tree found in the tropics. Of the semi-epiphytic, long-shoot trees the more widely distributed type does not have aerial roots. Such trees are found in the New Zealand rain-forests, the West Indies, and elsewhere. The true Banyan-type is described as aerial root-traveling trees of the tropics which send down roots to the ground not only along the trunk of the host tree but everywhere from the branches. These



A four-inch branch of a live yellow birch tree with an aerial root along the outside of the trunk. This is a very rare phenomenon in temperate forests and is indicative of the high humidity characteristic of the upper elevations of the Great Smoky Mountains.

roots grow into a number of "root-trunks" and thus enable the crown of the tree to spread over a very large area. These interlaced and connected trees are descendant from one parent for each colony and any part is capable of independent existence. The habit of sending down aerial roots from branches is rarely observed in yellow birch but it is occasionally seen in the Great Smoky Mountains.

—Stanley A. Cain.

MUSEUM ACTIVITIES

In the new offices of the Academy Miss Lane and Miss Kiewitz greet visitors and do the clerical work of the Museum.

The Offield-Beaty Arizona Expedition

Another scientific expedition to Arizona has been made possible for the Academy through the generosity of James R. Offield, one of the Trustees, and John Y. Beaty, a member of the Academy. The field party will leave Chicago early in May to continue zoological investigations, collect specimens, and make motion pictures of Arizona wildlife.

For the first few weeks headquarters will be at the Boyce Thompson Southwestern Arboretum, at Superior, a location admirably suited to the nature of the proposed field work. Mr. Fred Gibson, director, has extended a cordial invitation to the Academy to make use of the laboratory and guest house of the Arboretum. During the month of May it is planned to study and collect birds, reptiles, and arachnids in the desert valleys of the Salt and Gila Rivers. In early June the party expects to establish a base camp in the vicinity of Mount Graham in the Piñaleno Mountains and make collections at higher elevations. If time per-

mits, the Chiricahua and Huachuca Mountains will be visited.

Mr. and Mrs. Beaty will join the party at Superior and assist in the field work for a few weeks before visiting Tucson, Nogales and other points of interest in the Southwest.

The Academy has recently obtained a new 16 mm. motion picture camera and other equipment for making photographs in natural color. It is hoped that the results of this expedition will contain valuable photographic records of the colorful plant and animal life of the Southwest and be of great interest to those attending future lectures by members of the Academy staff.

This is the second expedition to Arizona sponsored by the Academy. The first, in the spring of 1937, obtained much valuable scientific material and motion pictures which have been frequently shown and enthusiastically received during the past two years.

Mr. and Mrs. Necker Return from Mexico

Due to the conflict for the balance of power in Europe, Mr. Necker was forced to abandon his proposed trip to England and Germany on a grant-in-aid from the Carnegie Foundation of New York, through the American Association of Museums, for the purposes of studying museums and extending his researches on the bibliography of herpetology. A trip to Mexico, expanding the scope of the grant to include a study of herpetological types, was allowed to be substituted for the European trip.

Mr. and Mrs. Necker have recently returned and report the following as partial results of the trip: Over four hundred and fifty volumes of periodicals, mostly unavailable or very fragmentary in the United States, were scanned for additions to the herpetological bibliography. Many additional books published in Mexico were also seen, and approximately five hundred new herpetological titles were obtained.

A corner of the director's room.

Library exchanges, involving about one hundred volumes, were arranged with great mutual benefit to the Academy and Mexican institutions.

Thirty-two museums and collections were visited, much material studied, and friendly relations with our Mexican colleagues were extended, the most noteworthy accomplishment being the study of the type specimens of the late Alfredo Dugés in the Colegio de Guanajuato. Photographs of many of the institutions and naturalists of Mexico were obtained and materials for at least three scientific papers were collected.

Space forbids mention here of the many people who aided the work by their hospitality and generosity, but without the cordial assistance of Don Rafael Aguilar y Santillan, Dr. Alfonso Dampf, and Dr. Isaac Ochoterana and his associates, Rafael Martin del Campo and Christoforo Vegas, the work accomplished would have been but a fragment of that actually done.

An article on Mr. Necker's impressions of Mexican science and institutions will appear in the next number of *The Chicago Naturalist.*

Dr. Allen to Lecture at Academy, April 22

Under the auspices of the Illinois Audubon Society, Dr. Arthur A. Allen of Cornell University will give an illustrated lecture, "Birds of America," in the auditorium of the Academy, April 22, at 8:00 P. M.

Dr. Allen's motion pictures are in color and are accompanied by sound recordings of bird songs. Among the remarkable and little-known species included are the coppery-tailed trogon and vermilion fly-catcher of southern Arizona, the roseate spoonbill of the Texas coast, and the California condor, white-tailed kite, and Allen's hummingbird of the Pacific region.

This lecture is free to the public.

Exhibits

The first of the new series of ecological exhibits on the third floor of the museum was opened to the public early in January. It depicts a mid-summer scene in a beech-maple climax forest. The association of plants is completed but representative animals are yet to be added. Work is going forward on the second and third groups in this series.

Fluorescent lamps have been installed in this new exhibit and in the panther group on the second floor. This type of lighting is particularly suitable for museum exhibition because of its ease of control, lack of appreciable heat, and the small amount of current needed. The nearly perfect simulation of daylight and elimination of harsh shadows produce an effect that is especially pleasing.

Visitors have given considerable attention to the exhibits of winter birds and bird feeders in the Museum lobby during the past several weeks. These will be replaced shortly by some common spring migrants, particularly warblers, and a series of mushrooms which may be found in the Chicago Area during spring and early summer.

Also on view in the lobby is a collection of gems and semi-precious stones.

The winter series of Sunday afternoon lectures was unusually well attended during the past three months. The auditorium was filled to capacity for nearly all lectures and on two occasions the programs were repeated for the accommodation of those who could not obtain seats at three o'clock.

Donald C. Lowrie and H. K. Gloyd attended the meetings of the Ecological Society of America and the American Society of Zoologists in connection with the annual convention of the American Association for the Advancement of Science at Columbus, Ohio, December 27 to 30, 1939.

New Members

The following were recently elected to membership in the Academy:

Life

Dr. William F. Henderson

Sustaining

Daniel Crumlish
Dr. Alfred E. Emerson
W. B. Johnson

Associate

Rose Botz
Kenneth R. Coe
William Hoferichter
William Hoppe
Alfred Novak
Dr. William E. Powers
Dolly Rieck
Peter B. Rodriguez
Ethel Schierbaum
Frederick D. Schmidt
William Schwalge
C. P. Shideler
Walter T. Stille
Alvin C. Ward

Miss Charlotte Kiewitz joined the staff of the Academy January 1 as receptionist and office assistant.

Recent Visitors

Dr. Max M. Peet, Professor of Surgery of the University of Michigan School of Medicine, while en route to the west coast, stopped to examine specimens in the Academy's collection of bird skins. Dr. Peet is an enthusiastic amateur ornithologist, especially interested in the "downy young" of shore birds.

Dr. Harriet Exline Frizzell of Negritos, Peru, visited the Academy to examine specimens and to discuss arachnological problems of mutual interest with Mr. Donald C. Lowrie. For the past two years Dr. Frizzell has studied spiders in Peru where her husband, Dr. Don L. Frizzell, is employed as a petroleum geologist. The Frizzells are visiting the United States for a period of six months, after which they will return to Peru.

Other distinguished visitors at the Academy recently were Miss Crystal Thompson, curator of visual education, University of Michigan Museums; Miss Margaret Brayton, Detroit Children's Museum; Dr. Elzada U. Clover, Botanical Gardens, University of Michigan; Mr. and Mrs. Fred R. Cagle, Museum of Natural and Social Sciences, Illinois State Normal University, Carbondale.

Dr. Gloyd gave an illustrated lecture entitled "Story Book Snakes and Snake Stories" at the Cranbrook Institute of Science, Bloomfield Hills, Michigan, on the evening of March 13.

New Scientific Publications

The second number of Volume 6 of the *Bulletin of the Chicago Academy of Sciences* was published February 17, 1940. It is entitled "A New Rattlesnake from Mexico," by Howard K. Gloyd and Carl F. Kauffeld, and describes a new species of rattlesnake based upon specimens in the collection of the Academy and the Staten Island Zoological Society.

Dr. Gloyd's monographic study of the rattlesnakes, *Special Publication Number 4* of the Academy, is now nearly through the press and will be available in April. A more complete announcement will appear in the next number of *The Chicago Naturalist.*

Herpetologica, a journal devoted to reptiles and amphibians edited at the Academy by Chapman Grant and Walter L. Necker, has finished its first volume of over two hundred pages. It contains over sixty contributions to the study of herpetology, ranging from taxonomy and regional lists to anatomy and biography, including the description of seventeen new species and two new genera. Although not an Academy publication, *Herpetologica* contributes to the prestige of this institution in American herpetology.

Rocky Mountain Vacations

Dr. V. O. Graham, secretary of the Academy, and Ranger D. A. Mitchell will take two parties of nature students to the Rocky Mountains this summer. These carefully planned trips of thirty days each will afford rare opportunities for the observation of wildlife and its relation to the climatic and edaphic factors of environment, as well as pleasant experiences in camping and living in the open.

Like our spring flora about Chicago are the mid-summer flowers of the mountain pastures of high elevation, but on the other hand sunny exposures of lower elevation may just as certainly contain a flora strangely similar to ours in autumn. One may tread the moist, spongy upland, near the tree-line, among white marsh marigolds, spring beauties, buttercups, and forget-me-nots, then descend three or four thousand feet to a sun-exposed plain to find sunflowers, marigolds, asters, fleabanes, and fringed gentians suggestive of the eastern autumn.

Mr. D. A. Mitchell is a western man with many years of experience as a ranger-naturalist in our National Parks. He has been a cow-puncher, a member of the Canadian Mounted Police (they "get their man") and later a National Park ranger.

Dr. Graham has an intimate knowledge of plant and animal life. His love of nature has led him to camp, and study wild-life in more than half of the states of our country. He served several years as a scientific governor of the Chicago Academy of Sciences before his election as secretary of that organization.

You are invited to join one of the two trips offered this summer. The first leaves the Chicago Academy of Sciences the morning of June 24 for 30 days including Yellowstone and Grand Teton National Parks. The second leaves the Chicago Academy of Sciences August 27 for 30 days including Lake Louise in the Canadian Rockies and Glacier National Park.

For additional information write Mitchell's Camp Fire Tours, Room 1511, First National Bank Building, Chicago, or telephone Dr. Graham (Pensacola 1898).

Spring Nature Tour at Starved Rock State Park

The second Annual Spring Nature Tour will be held at Starved Rock State Park, Utica, Illinois, on April 27 and 28, under the direction of Dr. Donald T. Ries, State Park Naturalist regularly stationed at Starved Rock with the cooperation of the Illinois State Natural History Survey, Illinois State Geological Survey, and the Chicago Academy of Sciences.

A large corps of assisting leaders has been carefully chosen so as to provide a recognized authority in nearly every major field of natural science. Present to conduct trips and lead discussions will be: Dr. George D. Fuller, professor emeritus of botany, University of Chicago; Dr. Theodore H. Frison, chief, Illinois State Natural History Survey; Dr. Howard K. Gloyd, director, Chicago Academy of Sciences; Dr. George E. Ekblaw, geologist, Illinois State Geological Survey; Dr. Carl O. Mohr, mammalogist, Dr. Ralph E. Yeager, forester, and Arthur S. Hawkins, ornithologist, all of the Illinois State Natural History Survey; William S. Buttles, astronomer, Chicago; Gordon Pearsall, curator of Trailside Museum, River Forest; Father George M. Link, State Park Naturalist, Pere Marquette State Park; John E. Abrahamson, geologist, and Charles J. Alikonis, biologist, Ottawa Township High School.

Registration will take place on Saturday morning (no charges of any kind will be connected with the Nature Tour). In the afternoon specialists will conduct trips in their respective subjects and in the evening in the main lounge of the Lodge Dr. Frison will describe some of the conservation work of the Illinois State Natural History Survey. Following this there will be an astronomical session under the direction of Mr. Buttles.

Runner of the Mountain Tops. The Life of Louis Agassiz.

By Mabel L. Robinson

Random House, New York, 1939. xii, 290 pages, 7 plates, $3.00.

Louis Agassiz. A magic name! To the teacher, a model of inspiration hard to follow in the class room; to the scientist, a model of energy and research; to us in a museum, the brilliant founder of America's first museum, a rare combination of scientist and administrator. The name of Louis Agassiz brings forth a picture of energy and research in spite of adversities, a picture of a real teacher, a scientist, founder of museums. There is a short essay by Dallas Lore Sharp called *Turtle Eggs for Agassiz* which goes a long way toward making Agassiz a human being; most other articles have been of interest to those of us who admire his work as a pioneer in science, who admire the result of his enthusiasm for collections—the Agassiz Museum of Harvard University, now known as the Museum of Comparative Zoology.

Whatever a stolid scientist may desire in a biography is really immaterial if Agassiz can be pictured as the man that he was, light hearted and carefree, enthusiastic and perhaps at times dogmatic—but a real human being, not a mere writer of monumental books. Whatever Agassiz may have contributed to science is slight and negligible compared to the inspiration he gave to a generation of teachers and scientists. Their contributions are his, and he who inspired their work comes to life, strongly, vividly, in Miss Robinson's book. She treats him as a hero, but a human one, with faults and hopes and disappointments common to all men.

It seems that scientists make poor material for biographies, for the few readable ones can be counted on one's fingers! Perhaps writers of biographies are the cause. At any rate, there are so pitifully few that make one feel "I know that man, and knowing him I am inspired." Miss Robinson is to be congratulated on recreating Agassiz, the teacher, the scientist, the museologist, above all, the man.

—W. L. Necker

Siftings

By Jens Jensen

Ralph Fletcher Seymour, Chicago, 1939. 110 pages, $1.00.

From the pen of the landscape architect, who in nature saw landscaping of unsurpassed beauty, each plant fitting snugly into the total picture, has come this masterpiece, replete with descriptive paragraphs woven together to present the controling idealism of one who did so much toward saving some of our native landscape.

In the first chapter, "Art has its Roots in the Soil," the relationship between nature and art is portrayed in poetic language. "Early Impressions" recounts the scenes and events of the author's life and includes many descriptive pictures of the farm, the sea, and the prairie. Other chapters, "Environmental Influences," "Our Native Landscape," "Towns," and "The Garden," bring repeated surprises to those who in imagination love to see beautiful natural scenes.

—V. O. Graham

Birdhouses

By Paul V. Champion

Bruce Publishing Company, Milwaukee, Wisconsin, 1939. 96 pages, profusely illustrated. $1.25.

Here is an excellent book which should be in the hands of every manual training teacher and scout leader. The houses described by Mr. Champion are not ideas thought up merely to fill the pages of a book, but are the result of many years of experience in directing the building of bird houses in the public schools of Indiana. The book shows how to make twenty-five different bird houses—and really *shows*. Each one is illustrated by a full-page plate of drawings, descriptive text, and a photograph of the house set up in a suitable place. Anyone can follow the clear directions. And there is an interesting section on the utilization of cheap building materials such as apple and orange crates. For the home workshop this is unquestionably the best book on bird houses.

—W. L. Necker

How to Know the Trees

By H. E. Jacques

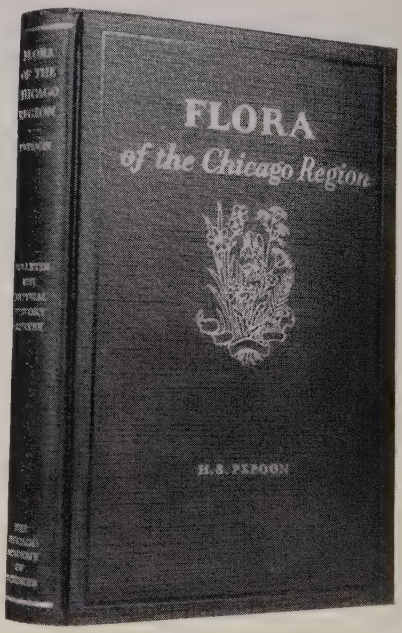
Published by the author, 709 N. Main St., Mt. Pleasant, Iowa, 1940. 152 pages. Spiral binding, $1.00, cloth, $1.80.

Approximately two hundred trees found in the eastern half of the United States are described and illustrated. Each illustration is enclosed in a rectangle and contains leaves, flowers, fruits, twig, and a distribution map. Keys are included for the identification of trees in either summer or winter. This book will prove valuable for high school or college classes not only for the identification of trees, but also in pointing out clearly the differences in leaf shape, flowers, fruits, and twigs of the various trees. This book is a real contribution, doubtless because it has been created in connection with classwork where defects were seen and corrected while the text was in the making.

—V. O. Graham

"Flora of the Chicago Region" Reduced in Price

By recent action of the Board of Trustees, the remainder of Dr. Pepoon's *Flora of the Chicago Region,* the price of which was formerly $3.50, has been placed on sale at $1.25 per copy, postpaid. This most useful book for the botanist and nature lover of the



Middle West is the only complete account of the plants of the Chicago Area and adjacent territory. Part I contains a series of chapters discussing plant associations such as the Waukegan Moorlands, the Des Plaines River Drainage Basin, and the Sand Dune Region of the southeastern shore of Lake Michigan. Part II is an annotated catalog of ferns and seed plants of the Chicago Area. There is also a winter key to the trees of the region by Dr. V. O. Graham. The book is illustrated by photographs and line drawings and is strongly bound in cloth.

Living Specimens in the School Laboratory

General Biological Supply House, 761-763 East 69th Place, Chicago, 1940, 96 pages, illustrated. $1.00.

This handy little booklet describes some of the most practical methods for the rearing of more than a hundred kinds of marine and fresh-water animals. Anyone interested in a backyard zoo, and especially teachers, will find this pamphlet an invaluable aid. An excellent index, a bibliography, many good illustrations, and a table covering in condensed form the material of the booklet, make it a very usable addition to any zoologist's library.

—D. C. Lowrie

A few dozen copies of *At Home With the Birds,* a book for children, by Alfred M. Bailey and Earl G. Wright, out of print for some time, are now available at 15 cents per copy. This attractive little book describes a number of common birds and their habits especially for younger readers, and is illustrated by photographs by Mr. Bailey and large colored reproductions of paintings by Mr. Wright.

The Birds of Denver and Mountain Parks

By Robert J. Niedrach and Robert B. Rockwell

Colorado Museum of Natural History, 1939. 196 pages, illustrated.

A well-bound annotated list of birds of the Denver Region, with records of specimens mostly from the Colorado Museum. Most of the excellent pictures are by Alfred M. Bailey and Robert J. Niedrach.

An Interesting Library Service

Do you want to get ahead in your job? Are you interested in having a high school or college diploma? Does your English need improvement? Would you like to live dangerously, selfishly, self-sacrificingly, through books?

If so, the Chicago Public Library will help you in a special department called Readers' Bureau. This is a department for grown people, out of school, but still interested in education. It imposes no conditions except a desire to read. The educational background of the applicant may vary from third grade to post-graduate college. He may go as fast or as slowly as he pleases.

The procedure is simple: *first,* a personal conference, if possible with the Readers' Adviser in the Central Library, if not, with an attendant in the nearest branch library; *second,* a personal reading prescription prepared and the first book given to you; *third,* the rest of the books issued in the prescribed order.

The number of books recommended, degree of difficulty, and subjects covered vary with the schooling, purpose in reading, time for reading, and other factors in each individual case.

More than 30,000 people have taken advantage of this service. As a result of it, some report advancement or success in a new job. Some passed college entrance examinations, and others made up high school credits. One or two have made an income on a hobby. Foreign-born have perfected their English. Many have learned for the first time of other important resources of the library such as sheet music, foreign books, stereopticon slides, patent records, current periodicals and books for the blind.

This service, called *Readers' Advisory Service,* is free at the Central Library or at any of the branch libraries.

THE NATURALIST'S CALENDAR OF EVENTS

AMATEUR HERPETOLOGISTS' GROUP, W. L. Necker, Chicago Academy of Sciences, Diversey 5871. Meetings at Academy second Tuesday of each month, 7:30 P. M.

CHICAGO ACADEMY OF SCIENCES, Lincoln Park at Clark and Ogden Ave., Diversey 5871.

CHICAGO AQUARIUM SOCIETY, Mr. Harmon K. Greene, Secretary, Plaza 2088. Meetings third Wednesday of each month, 8:00 P. M.

CHICAGO CACTUS SOCIETY, Mr. Frank K. Balthis, President, Garfield Park Conservatory, Kedzie 1281. Meetings last Sunday each month, Garfield Park Conservatory, 3:00 P. M.

CHICAGO ENTOMOLOGICAL SOCIETY, Mr. Alex K. Wyatt, Secretary, 5909 N. Virginia Avenue, Ravenwood 3115.

CHICAGO ORNITHOLOGICAL SOCIETY, Mr. Rudyerd Boulton, President, Field Museum, Wabash 9410. Meetings third Tuesday each month, Auditorium Building, 431 South Wabash Avenue, 8:00 P. M.

FRIENDS OF OUR NATIVE LANDSCAPE, Miss R. B. Eskil, 6016 Ingleside Avenue. Hyde Park 8313.

GEOGRAPHIC SOCIETY OF CHICAGO, 7 S. Dearborn, Randolph 5293.

ILLINOIS AUDUBON SOCIETY, Chicago Academy of Sciences, Diversey 5871.

MARQUETTE GEOLOGISTS ASSOCIATION, Mr. George J. Huss, Secretary, Canal 1828. Meetings at Academy first Saturday of each month, 8:00 P. M.

MID-WEST HORTICULTURAL SOCIETY, Administration Building, Garfield Park, Van Buren 8100. Meetings last Friday each month.

PRAIRIE CLUB, 38 S. Dearborn Street, Dearborn 3737.

STATE MICROSCOPICAL SOCIETY OF ILLINOIS, W. L. Necker, Chicago Academy of Sciences, Diversey 5871. Meetings at Academy third Friday of each month, 8:00 P. M.

April 8 Chicago Academy of Sciences, Annual Meeting, *Two Thrilling Adventures in Arctic Exploration*, Dr. James Alton James, 8:00 P. M.

April 9 Amateur Herpetologists' Group, Auditorium, Chicago Academy of Sciences, 7:30 P. M.

April 9 Geographic Society of Chicago, *Timber Line*, Martin K. Bovey, Orchestra Hall, 8:00 P. M. (Members).

April 13 Prairie Club thirty-second anniversary walk from Wooddale to Bensenville. Dinner at Plentywood Farm.

April 13 and 14 Illinois Audubon Society field trip to Havana, Illinois. Inquiries may be made at the Academy office, Diversey 5871.

April 14 Chicago Ornithological Society field trip to Orland Wild Life Preserve. Inquiries may be made of Mrs. Margaret Morse Nice, 5708 Kenwood Avenue, Chicago, Plaza 3741.

April 14 Prairie Club walk from Willow Springs to Lemont, 10-12 miles.

April 16 Chicago Ornithological Society, *Winter Weight Records of Birds Banded at Palos*

Park, Alfred J. Reuss, Jr., Auditorium Building, 431 South Wabash Avenue, 8:00 P. M.

April 17 Chicago Aquarium Society, lecture by Fred B. Orsinger of the Bureau of Fisheries Aquarium, Washington, D.C., West Room, Y. M. C. A., 19 South LaSalle Street, 8:00 P. M.

April 20 State Microscopical Society of Illinois, second of the series of lectures on microzoology, Auditorium, Chicago Academy of Sciences, 2:30 P. M.

April 20 Prairie Club walk from Oak Forest to Tinely Park, 5 miles.

April 20 Illinois Audubon Society bird study walk in Lincoln Park. Group assembles at entrance to Chicago Academy of Sciences at 8:00 A. M.

April 21 Chicago Entomological Society, Reading Room, Chicago Academy of Sciences, 2:00 P. M.

April 21 Prairie Club walk near Lemont, 6-7 miles.

April 22 Illinois Audubon Society annual spring lecture, *Birds of America,* Dr. Arthur A. Allen, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

April 23 Geographic Society of Chicago, *Skiing America First,* Sidney Shurcliff, Orchestra Hall, 8:00 P. M. (Members).

April 27 Prairie Club walk at the Sag, 6-7 miles.

April 28 Prairie Club walk from Wheeling to Des Plaines, about 10 miles.

April 28 Chicago Ornithological Society field trip to Chicago Ridge.

April 26 Mid-West Horticultural Society, Administration Building, Garfield Park, 8:00 P. M.

April 26 State Microscopical Society of Illinois, demonstration of technique of microscopical fungi, Dr. Tibor Benedek, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

April 27 and 28 Second Annual Spring Nature Tour, Starved Rock State Park. Inquiries may be addressed to Dr. Donald T. Ries, Starved Rock State Park, Utica, Illinois. (See page 26.)

April 27 Illinois Audubon Society bird study walk in Lincoln Park. Group assembles at entrance to Chicago Academy of Sciences at 8:00 A. M.

April 28 Chicago Cactus Society, Garfield Park Conservatory, 3:00 P. M.

May The Friends of Our Native Landscape will hold their Pilgrimage to the Wild Crabapple in the Forest Preserve near Oakton Road on a Saturday afternoon in May, when the crabapples are in bloom. There will be a Council Fire at sunset. Persons wishing to receive a notice may address Mr. E. T. Baroody, 3130 Wenonah Avenue, Berwyn, Illinois.

May 4 Illinois Audubon Society, the guests of the Indiana Audubon Society for a field trip at Turkey Run, Indiana.

May 4 Prairie Club walk in Lyman Woods, Downers Grove, 4-5 miles.

May 4 Marquette Geologists' Association, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

May 11 State Microscopical Society of Illinois, third of the series of lectures on microzoology, Auditorium, Chicago Academy of Sciences, 2:30 P. M.

May 11 Illinois Audubon Society bird study walk in Lincoln Park. Group assembles at entrance

to Chicago Academy of Sciences at 8:00 A. M.

May 12 Chicago Ornithological Society field trip to Waukegan Dunes.

May 14 Amateur Herpetologists' Group, Auditorium, Chicago Academy of Sciences, 7:30 P. M.

May 15 Chicago Aquarium Society, Chicago Room, Y. M. C. A., 19 South LaSalle Street, 8:00 P. M.

May 17 State Microscopical Society of Illinois, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

May 18 Illinois Audubon Society bird study walk in Lincoln Park. Group assembles at entrance to Chicago Academy of Sciences at 8:00 A. M.

May 21 Chicago Ornithological Society, *Homing Faculty and Homing Experiments,* Rudyerd Boulton, Auditorium Building, 431 South Wabash Avenue, 8:00 P. M.

May 24 Mid-West Horticultural Society, *How to Make and Maintain a Lawn,* Orion W. Sheets, Administration Building, Garfield Park, 8:00 P. M.

May 25 Illinois Audubon Society bird study walk in Lincoln Park. Group assembles at entrance to Chicago Academy of Sciences at 8:00 A. M.

May 26 Chicago Cactus Society, Garfield Park Conservatory, 3:00 P. M.

May 26 Chicago Ornithological Society field trip to Riverside, Illinois.

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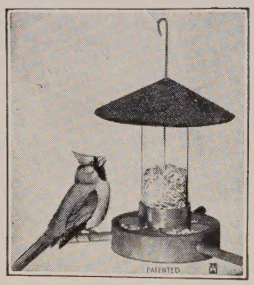

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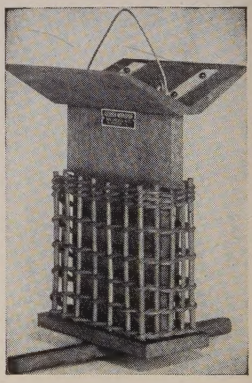

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